2004-12-30 19:24:55 (GMT) Novak Druce LLP From: Tracy Druce

To: Commissioner for Patents Page 3 of 15

Serial No.: 09/955,225 Reply to Official Action

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the

application:

Listing of Claims:

1. (Original) A method of processing information represented by an original series

of (run, level) pairs, said method comprising:

a) inspecting the (run, level) pairs in the original series of (run, level) pairs to

determine whether or not modification of at least one (run, level) pair in the original

series of (run, level) pairs would produce a desirable decrease in a number of bits

required for variable-length encoding of said information despite introduction of noise

into the variable-length encoding of said information; and

b) upon determining that modification of said at least one (run, level) pair in the

original series of (run, level) pairs would produce a desirable decrease in the number of

bits required for variable-length encoding of said information despite introduction of

noise into the variable-length encoding of said information, modifying said at least one

(run, level) pair to produce a modified series of (run, level) pairs from the original series

of (run, level) pairs; and

Scrial No.: 09/955,225 Reply to Official Action

c) variable-length encoding the modified series of (run, level) pairs.

2. (Original) The method as claimed in claim 1, which is performed by sequentially

inspecting each (run, level) pair to determine whether or not modification of said each

(run, level) pair would produce a desirable decrease in the number of bits required for

variable-length encoding of said information despite introduction of noise into the

variable-length encoding of said information; and if modification of said each (run, level)

pair would produce a desirable decrease in the number of bits required for variable-length

encoding of said information despite introduction of noise into the variable-length

encoding of said information, then modifying said each (run, level) pair; and then

variable-length encoding said each (run, level) pair.

3. (Original) The method as claimed in claim 1, wherein the inspecting the (run,

level) pairs in the original series of (run, level) pairs includes lookup of a table specifying

whether or not certain (run, level) pairs should be modified.

4. (Original) The method as claimed in claim 1, wherein the inspecting the (run,

level) pairs in the original series of (run, level) pairs includes testing for certain ranges of

run lengths and level values to determine whether or not certain (run, level) pairs should

be modified.

To: Commissioner for Patents Page 5 of 15

2004-12-30 19:24:55 (GMT)

Novak Druce LLP From: Tracy Druce

Serial No.: 09/955,225 Reply to Official Action

5. (Original) The method as claimed in claim 1, wherein said at least one (run,

level) pair has a run length of M that is greater than zero and a level value of N, and the

production of the modified series of (run, level) pairs from the original series of (run,

level) pairs includes substituting, for said at least one (run, level) pair, a first (run, level)

pair immediately followed by a second (run, level) pair, the first (run, level) pair having a

run length of M-1 and a level having a minimum non-zero magnitude, the second (run,

level) pair having a run length of zero and a level value of N.

6. (Original) The method as claimed in claim 5, which includes decoding the

variable-length encoding of the modified series of (run, level) pairs to produce a decoded

series of (run, level) pairs, and inspecting the (run, level) pairs in the decoded series of

(run, level) pairs to find the first (run, level) pair having a minimum non-zero magnitude

immediately followed by the second (run, level) pair having a run length of zero, and

determining that the first (run, level) pair is likely to be noise introduced during the

production of the modified series of (run, level) pairs from the original series of (run,

level) pairs and therefore rejecting the first (run, level) pair.

7. (Original) The method as claimed in claim 6, which includes a table lookup for

determining that the first (run, level) pair is likely to be noise introduced during the

To: Commissioner for Patents Page 6 of 15

2004-12-30 19:24:55 (GMT)

Serial No.: 09/955,225 Reply to Official Action

production of the modified series of (run, level) pairs from the original series of (run,

level) pairs.

8. (Original) The method as claimed in claim 1, which includes decoding the

variable-length encoding of the modified series of (run, level) pairs to produce a decoded

series of (run, level) pairs, and inspecting the (run, level) pairs in the decoded series of

(run, level) pairs to find (run, level) pairs likely to be noise introduced during the

production of the modified series of (run, level) pairs from the original series of (run,

level) pairs and therefore rejecting the (run, level) pairs likely to be noise introduced

during the production of the modified series of (run, level) pairs from the original series

of (run, level) pairs.

9. (Original) A method of variable-length encoding a block of pixels, the method

comprising:

a) computing a two-dimensional discrete cosine transform (DCT) of the block of

pixels to produce a series of DCT coefficient values;

b) quantizing the DCT coefficient values to produce quantized coefficient values;

2004-12-30 19:24:55 (GMT)

To: Commissioner for Patents Page 7 of 15

Novak Druce LLP From: Tracy Druce

Serial No.: 09/955,225 Reply to Official Action

c) producing an original series of (run, level) pairs each having a level value

indicating a respective non-zero quantized coefficient value;

d) inspecting the (run, level) pairs in the original series of (run, level) pairs to

determine whether or not modification of at least one (run, level) pair in the original

series of (run, level) pairs would produce a desirable decrease in a number of bits

required for variable-length encoding of said block of pixels despite introduction of noise

into the variable-length encoding of said block of pixels; and

e) upon determining that modification of said at least one (run, level) pair in the

original series of (run, level) pairs would produce a desirable decrease in the number of

bits required for variable-length encoding of said block of pixels despite introduction of

noise into the variable-length encoding of said block of pixels, modifying said at least

one (run, level) pair to produce a modified series of (run, level) pairs from the original

series of (run, level) pairs; and

f) variable-length encoding the modified series of (run, level) pairs.

10. (Original) The method as claimed in claim 9, which is performed by sequentially

inspecting each (run, level) pair to determine whether or not modification of said each

(run, level) pair would produce a desirable decrease in the number of bits required for

To: Commissioner for Patents Page 8 of 15

2004-12-30 19:24:55 (GMT)

Novak Druce LLP From: Tracy Druce

Serial No.: 09/955,225 Reply to Official Action

variable-length encoding of said block of pixels despite introduction of noise into the

variable-length encoding of said block of pixels; and if modification of said each (run,

level) pair would produce a desirable decrease in the number of bits required for variable-

length encoding of said block of pixels despite introduction of noise into the variable-

length encoding of said block of pixels, then modifying said each (run, level) pair; and

then variable-length encoding said each (run, level) pair.

11. (Original) The method as claimed in claim 9, wherein the inspecting of the (run,

level) pairs in the original series of (run, level) pairs includes lookup of a table specifying

whether or not certain (run, level) pairs should be modified.

12. (Original) The method as claimed in claim 9, wherein the inspecting of the (run,

level) pairs in the original series of (run, level) pairs includes testing for certain ranges of

run lengths and level values to determine whether or not certain (run, level) pairs should

be modified.

13. (Original) The method as claimed in claim 9, wherein said at least one (run,

level) pair has a run length of M that is greater than zero and a level value of N, and the

production of the modified series of (run, level) pairs from the original series of (run,

level) pairs includes substituting, for said at least one (run, level) pair, a first (run, level)

pair immediately followed by a second (run, level) pair, the first (run, level) pair having a

Novak Druce LLP From: Tracy Druce

Serial No.: 09/955,225 Reply to Official Action

run length of M-1 and a level having a minimum non-zero magnitude, and the second (run, level) pair having a run length of zero and a level value of N.

- 14. (Original) The method as claimed in claim 9, wherein the production of the original series of (run, level) pairs from the quantized DCT coefficient values includes identifying some DCT coefficients having non-zero values that are less significant than values of other DCT coefficients, the original series of (run, level) pairs does not include (run, level) pairs encoding level values for said some DCT coefficients, said first (run, level) pair specifies a level value for one of said some DCT coefficients, said one of said some DCT coefficients has a sign, and the level value of said first (run, level) pair is selected to have the same sign as the sign of said one of said some DCT coefficients.
- 15. (Original) The method as claimed in claim 9, wherein the production of the original series of (run, level) pairs from the quantized DCT coefficient values includes identifying some DCT coefficients having non-zero values that are less significant than values of other DCT coefficients, the original series of (run, level) pairs does not include (run, level) pairs encoding level values for said some DCT coefficients, and the method includes modifying at least one (run, level) pair in order to reduce noise without increasing the number of bits for the variable-length encoding by including in the modified series a (run, level) pair encoding a minimum magnitude level for at least one of said some DCT coefficients, said at least one of said some DCT coefficients has a sign,

2004-12-30 19:24:55 (GMT)

Serial No.: 09/955,225 Reply to Official Action

and the (run, level) pair encoding a minimum magnitude level for said at least one of said some DCT coefficients has a sign equal to the sign of the said at least one of said some DCT coefficients.

16. (Original) A method of producing MPEG encoded video from an original series of MPEG-compliant (run, level) pairs, said method comprising:

a) inspecting the (run, level) pairs in the original series of (run, level) pairs to determine whether or not modification of at least one (run, level) pair in the original series of (run, level) pairs would produce a desirable decrease in a number of bits in the MPEG encoded video despite introduction of noise into the MPEG encoded video; and

b) upon determining that modification of said at least one (run, level) pair in the original series of (run, level) pairs would produce a desirable decrease in the number of bits in the MPEG encoded video despite introduction of noise into the MPEG encoded video, replacing said at least one (run, level) pair with a sequence of a first (run, level) pair and a second (run, level) pair to produce a modified series of (run, level) pairs from the original series of (run, level) pairs, said at least one (run, level) pair having a non-zero run length of M and a non-zero level value of N, the first (run, level) pair having a run length of M-1 and a level magnitude of one, and the second (run, level) pair having a run length of zero and a level value of N, and

Novak Druce LLP From: Tracy Druce

Serial No.: 09/955,225 Reply to Official Action

c) variable-length encoding the modified series of (run, level) pairs to produce the

MPEG encoded video.

17. (Original) The method as claimed in claim 16, which includes sequentially

inspecting each (run, level) pair in the original series of MPEG-compliant (run, level)

pairs to determine whether or not modification of said each (run, level) pair would

produce a desirable decrease in the number of bits in the MPEG encoded video despite

introduction of noise into the MPEG encoded video; and if modification of said each

(run, level) pair would produce a desirable decrease in the number of bits required in the

MPEG encoded video despite introduction of noise into the MPEG encoded video, then

modifying said each (run, level) pair; and then variable-length encoding said each (run,

level) pair.

18. (Original) The method as claimed in claim 16, wherein the inspecting of the (run,

level) pairs in the original series of MPEG-compliant (run, level) pairs includes lookup of

a table specifying whether or not certain (run, level) pairs should be modified.

19. (Original) The method as claimed in claim 16, wherein the inspecting of the (run,

level) pairs in the original series of (run, level) pairs includes testing for certain ranges of

To: Commissioner for Patents Page 12 of 15

2004-12-30 19:24:55 (GMT)

Serial No.: 09/955,225

Reply to Official Action

run lengths and level values to determine whether or not certain (run, level) pairs should

be modified.

Claims 20-22 (Cancelled).

23. (Original) A digital computer for producing MPEG encoded video from an

original series of MPEG-compliant (run, level) pairs, said digital computer comprising at

least one processor programmed for:

a) inspecting the (run, level) pairs in the original series of (run, level) pairs to

determine whether or not modification of at least one (run, level) pair in the original

series of (run, level) pairs would produce a desirable decrease in a number of bits in the

MPEG encoded video despite introduction of noise into the MPEG encoded video; and

b) upon determining that modification of said at least one (run, level) pair in the

original series of (run, level) pairs would produce a desirable decrease in the number of

bits in the MPEG encoded video despite introduction of noise into the MPEG encoded

video, replacing said at least one (run, level) pair with a sequence of a first (run, level)

pair and a second (run, level) pair to produce a modified series of (run, level) pairs from

the original series of (run, level) pairs, said at least one (run, level) pair having a non-zero

run length of M and a non-zero level value of N, the first (run, level) pair having a run

2004-12-30 19:24:55 (GMT)

Novak Druce LLP From: Tracy Druce

To: Commissioner for Patents Page 13 of 15

Serial No.: 09/955,225 Reply to Official Action

length of M-1 and a level magnitude of one, and the second (run, level) pair having a run

length of zero and a level value of N; and

c) variable-length encoding the modified series of (run, level) pairs to produce the

MPEG encoded video.

24. (Original) The digital computer as claimed in claim 23, wherein said at least one

processor is programmed for sequentially inspecting each (run, level) pair in the original

series of MPEG-compliant (run, level) pairs to determine whether or not modification of

said each (run, level) pair would produce a desirable decrease in the number of bits

required in the MPEG encoded video despite introduction of noise into the MPEG

encoded video; and if modification of said each (run, level) pair would produce a

desirable decrease in the number of bits required for variable-length encoding of the

MPEG encoded video despite introduction of noise into the MPEG encoded video, then

modifying said each (run, level) pair; and then variable-length encoding said each (run,

level) pair.

25. (Original) The digital computer as claimed in claim 23, wherein said at least one

processor is programmed for lookup of a table specifying whether or not certain (run,

level) pairs should be modified.

Serial No.: 09/955,225 Reply to Official Action

26. (Original) The digital computer as claimed in claim 23, wherein said at least one processor is programmed for testing for certain ranges of run lengths and level values to determine whether or not certain (run, level) pairs should be modified.

Claims 27-29 (Cancelled).